

Chapter VIII

RELATIONSHIP OF VE TO OTHER PROGRAMS AND DISCIPLINES

Introduction

VE supports the objectives of top management and makes significant contributions to other supporting programs and disciplines. VE brings together the appropriate skills necessary to capture a specific target of opportunity. It uses these skills in a coordinated undertaking to achieve all essential functions at minimum cost. Thus, VE is a means to utilize and manage defense resources more effectively. It complements rather than competes with other activities. The relationship of VE to some of the current DoD programs and disciplines is discussed in the following pages.

Program (Project) Management Offices

A major development in management within the DoD is the increased use of the Program (or Project) Management Office (PMO) concept. The PMO structure is intended to centralize and improve the management of major systems to assure their economical development, production, and operation. It is a means of balancing the desire for maximum usable performance in military material with the need for the largest number of effective force units under a given budgetary allocation. VE contributes to this objective. A sound VE program can help make a product more cost-competitive with other alternatives which are capable of performing the same type of mission. Or, it may serve to make a system economically feasible. In recent years, it has been necessary to terminate some major programs because they were overly complex. The result was excessive cost coupled with inadequate reliability making them unsuitable as weapon systems. VE tends to improve both aspects of this problem because it not only reduces cost, but also results in greater simplicity which usually leads to improved reliability. VE also benefits the force structure. Reducing the unit cost of an item means more units could be acquired for a given budget or that some other approved but unfunded item can be considered for procurement. Thus, lower cost means more units; higher cost means fewer units. By helping to reduce unit costs without sacrificing essential characteristics, VE in a program/project management organization is able to make a significant contribution to our defense posture. See Chapter IV for an additional discussion on VE in a PMO.

Cost Effectiveness

Cost effectiveness and VE share a common objective. "Both represent a systematic analysis of alternative ways of accomplishing given functions and of the costs associated with each alternative." As practiced, they are

¹Wells, Emerson N., "Cost Effectiveness and Value Engineering: A Comparative Analysis," SAVE Proceedings - 1968 National Conference (Chicago: Robert J. Mayer and Co.), page 54.

applied at entirely different levels. DoD cost-effectiveness studies are employed in the very early planning stage to compare the overall mission effectiveness and associated costs of alternative concepts in broad contexts. Typically, cost-effectiveness studies compare the mission effectiveness and economic impact of (1) alternative designs for fighter aircraft for a particular type of air support mission, or (2) missiles versus aircraft for a **strategic** mission, or (3) massive airlifts versus overseas pre-positioning of equipment for rapid response.

There are many opportunities to improve the interaction between cost effectiveness and VE. For example, alternative designs for various aircraft parts might be developed and compared while a specific aircraft design concept was adopted. Thus, a cost-effectiveness study may be complemented by VE efforts to ascertain the value levels of the proposals presented and, if suitable, propose additional alternatives. VE also may be used to achieve or even reduce the cost predicted for the selected alternative.

Program Analysis

A major development within the DoD is the increased use of program analysis. One author has defined this type of analysis as an "inquiry to assist decision makers in choosing preferred future courses of action by (1) systematically examining and re-examining the relevant objectives and the alternative policies or strategies for achieving them; and (2) comparing quantitatively where possible the economic cost, effectiveness (benefits), and risks of the alternatives. It is more a research strategy than a method or technique,² and in its present state of development it is more an art than a science." Thus program analysis may be viewed as an approach to, or way of looking at complex problems of choice under conditions of uncertainty.

This procedure employs high-level operational definitions to describe a system, and traditional cost-analysis techniques to analyze competing systems. During subsequent development of the selected overall systems, design of the subsystems is assigned to various design groups. A coordinating group is assigned the task of assuring that the subsystems will work together. The combined output of these individual groups is a design reflecting the emphasis on achieving functional compatibility and required performance with limited funds and time. Integration of VE into the program analysis effort contributes to the creation of an overall design having a total cost which is consistent with the worth of the system functions.

Configuration Management

Configuration management (CM) of defense systems has the following objectives: (1) provide the configuration identification, control, and status accounting needed for effective development, production, and support;

²Fisher, G.H. -The Rand Corporation, Cost Functions and Budgets (Cost Consideration in Systems Analysis), February 1968, page 3. Document AD666-616, Clearinghouse for Federal Scientific and Technical Information, Springfield, VA 22151.

(2) improve the efficiency of instituting changes; and (3) assure latitude in the design of systems and equipment. These objectives are achieved by processing changes to precisely described baselines through channels in accordance with a systematic procedure. VECPs can often be included in procedures to group all needed changes into blocks and thus minimize the change costs and any adverse effects on supply and maintenance activities.

Standardization

Standardization and VE are not opposing philosophies with the former attempting to freeze the status quo and VE trying to change it. Standardization efforts include procedures to enhance military effectiveness by accommodating innovations in technology and changes in the user's needs. Used where appropriate, standards can reduce total cost. In some cases, unnecessary costs occur because standards are not being used. In other cases, waste may occur because the standards used are obsolete. In either instance, VE may provide a useful input to standardization activities.

Reliability, Quality Assurance, Maintainability

These disciplines are employed to assure items of defense material which will perform as anticipated when programmed maintenance procedures are followed. Dollars spent to achieve a specific mission are influenced by equipment readiness. Readiness in turn is affected by the inherent reliability, quality, and maintainability characteristics of a system. These programs and VE are complementary. Proposed VE changes must include consideration of these aspects. Conversely, the solution to a problem in any of the above areas is likely to be beneficially influenced by a VE input. Often, VE leads to less complex solutions which tends to further enhance quality, reliability, and maintainability characteristics.

Life Cycle Costing

Life cycle costs include all costs incident to research, development, production, operation, maintenance, and disposal of a system. They are used to compare and evaluate the total costs of competing proposals based on the anticipated life of the product to be acquired. This approach determines the least costly of any alternatives. However, the selected alternatives may only represent the best of several poor candidates. VE may be used to develop additional worthy alternatives to consider before selecting the best choice. **Whereas life cycle costing emphasizes cost visibility, VE seeks optimum value.** The two disciplines are complementary because the former is required to achieve the latter.

Design to Cost

The objective of design to cost is: (1) to establish cost as a parameter equal in importance with technical requirements and schedules throughout the design, development, production, and operation of weapon systems, subsystems, and components; and (2) to establish cost elements as management goals for acquisition managers" and contractors to achieve the best balance between cost, acceptable performance, and schedule. DoD Directive 5000.1 requires that design to cost goals be provided to the developer during the development of

major weapon systems. VE's functional requirements concept can assist in assigning these goals and the VE methodology can be employed to help achieve the goals.

Whenever contract terms include design-to-cost incentives it may become necessary to ensure that there is no **duplication** between VE incentives and design-to-cost incentive fees and awards.

. Logistics Support Analysis

The primary objective of logistics support analysis is to assure the design includes adequate consideration of the effective and economical support of a system or equipment at all levels of maintenance for its programmed life cycle. This approach requires early consideration of maintenance and support needs. VE, when conducted early in the design and development phase, includes logistics considerations in order to assess the total impact on life cycle cost. VE generally results in lower costs for logistics support. The collateral savings feature of VE contract clauses (see Chapter III) encourages contractors to use their VE capabilities on logistics **aspects**.

Quality Circles

Quality circles are small groups whose members have a common interest in improving a product or their working environment so as to increase productivity. Quality circles often express their overall objectives in wording similar to the following:

- o To contribute to the improvement of the **enterprise** and its products.
- o To acknowledge the importance of the work force
- o To fully utilize human capabilities.
- o To develop a sense of organization and instill the "team spirit."

Quality circles have achieved remarkable successes in improving the quality and reliability of products, reducing the percentage of defects to an extremely small value, improving productivity, lowering costs, conserving energy and other resources, and reducing errors in business transactions.

VE and quality circles both strive to achieve a functional product at reduced cost. They both use many of the same tools but differ in methodology and implementation. Both VE and quality circles may be used simultaneously to achieve maximum benefits.

Summary

By seeking to achieve greater value, and utilizing the contributions of many organizational elements, VE reinforces the efforts **of** many programs and disciplines **which serve** management. The complementary relationship between VE and these programs and disciplines increases the likelihood that overall top management objectives will be achieved.